# Heart Disease Diagnostic Analysis

Importing necessary Packages

[21]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Load the dataset

[22]:
```
data = pd.read_csv("Heart Disease data.csv")
```

[23]:
```
data.head()
```

[23]:

| | age | sex | cp | trestbps | chol | fbs | restecg | thalach | exang | oldpeak | slope | ca | thal | target |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 52 | 1 | 0 | 125 | 212 | 0 | 1 | 168 | 0 | 1.0 | 2 | 2 | 3 | 0 |
| 1 | 53 | 1 | 0 | 140 | 203 | 1 | 0 | 155 | 1 | 3.1 | 0 | 0 | 3 | 0 |
| 2 | 70 | 1 | 0 | 145 | 174 | 0 | 1 | 125 | 1 | 2.6 | 0 | 0 | 3 | 0 |
| 3 | 61 | 1 | 0 | 148 | 203 | 0 | 1 | 161 | 0 | 0.0 | 2 | 1 | 3 | 0 |
| 4 | 62 | 0 | 0 | 138 | 294 | 1 | 1 | 106 | 0 | 1.9 | 1 | 3 | 2 | 0 |

Clean and Preprocessing the data

[24]:
```
data.isnull().sum()
```

[24]:
```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
```

```
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

[25]:
```
data.fillna(method='ffill', inplace=True)
```

```
C:\Users\reach\AppData\Local\Temp\ipykernel_16220\2866031220.py:1:
FutureWarning: DataFrame.fillna with 'method' is deprecated and will raise in a
future version. Use obj.ffill() or obj.bfill() instead.
  data.fillna(method='ffill', inplace=True)
```

[26]:
```
data=pd.get_dummies(data,drop_first=True)
```

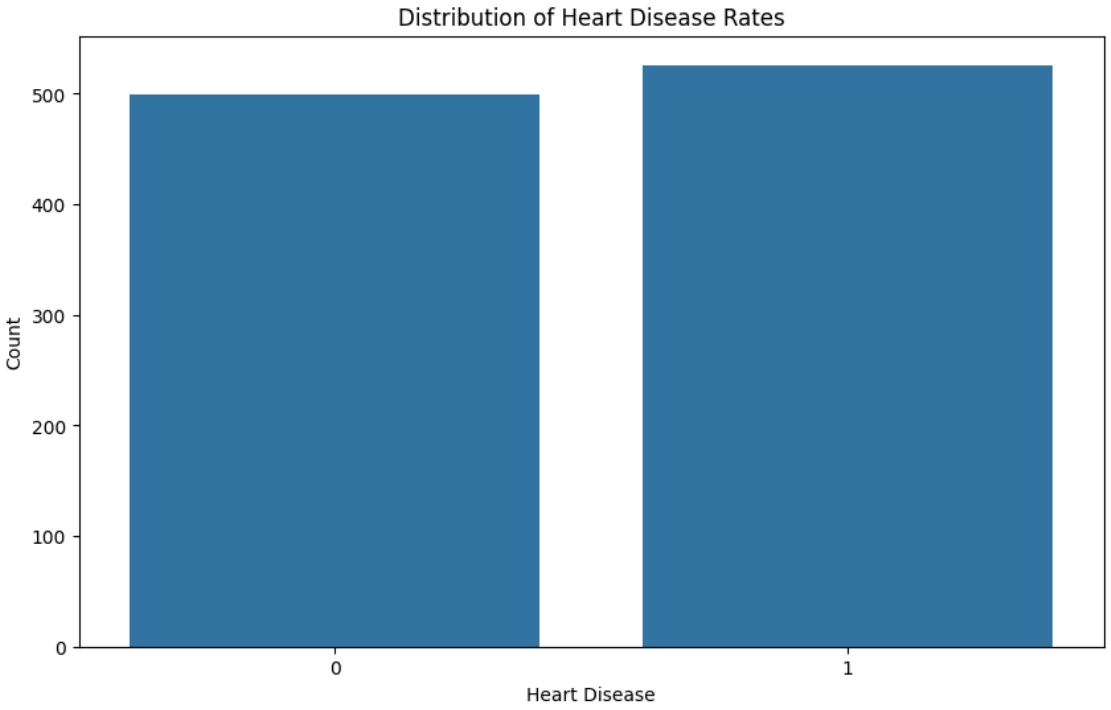
[27]:
```
data.head()
```

[27]:

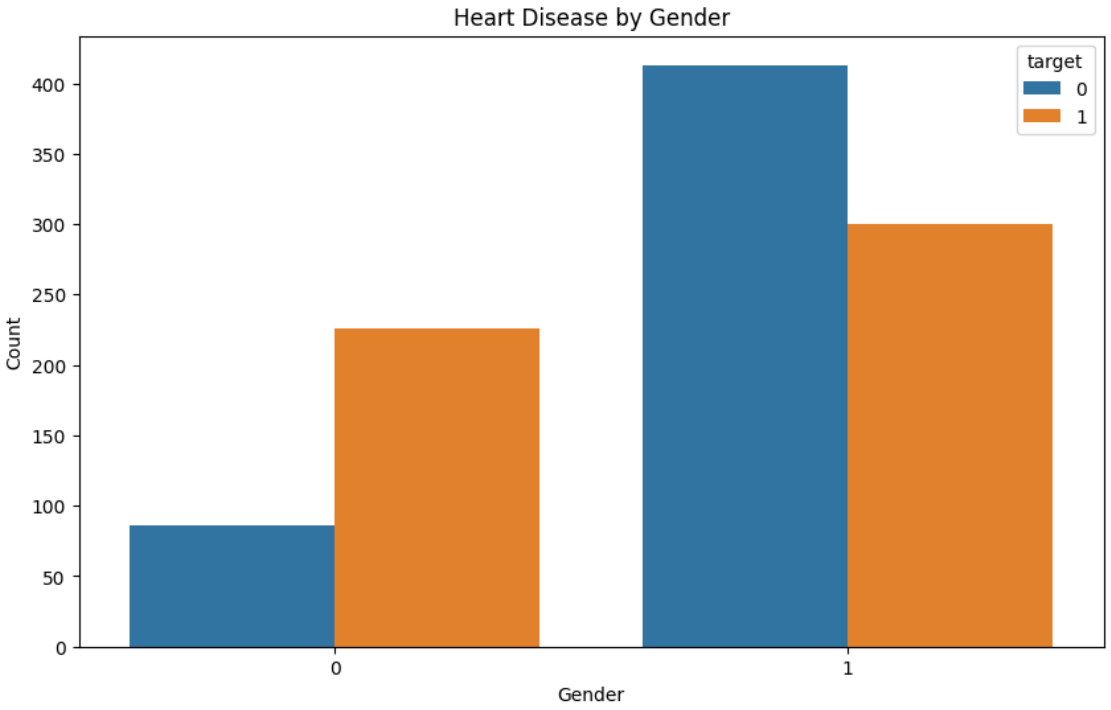
| | age | sex | cp | trestbps | chol | fbs | restecg | thalach | exang | oldpeak | slope | ca | thal | target |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 52 | 1 | 0 | 125 | 212 | 0 | 1 | 168 | 0 | 1.0 | 2 | 2 | 3 | 0 |
| 1 | 53 | 1 | 0 | 140 | 203 | 1 | 0 | 155 | 1 | 3.1 | 0 | 0 | 3 | 0 |
| 2 | 70 | 1 | 0 | 145 | 174 | 0 | 1 | 125 | 1 | 2.6 | 0 | 0 | 3 | 0 |
| 3 | 61 | 1 | 0 | 148 | 203 | 0 | 1 | 161 | 0 | 0.0 | 2 | 1 | 3 | 0 |
| 4 | 62 | 0 | 0 | 138 | 294 | 1 | 1 | 106 | 0 | 1.9 | 1 | 3 | 2 | 0 |

Exploratory Data Analysis

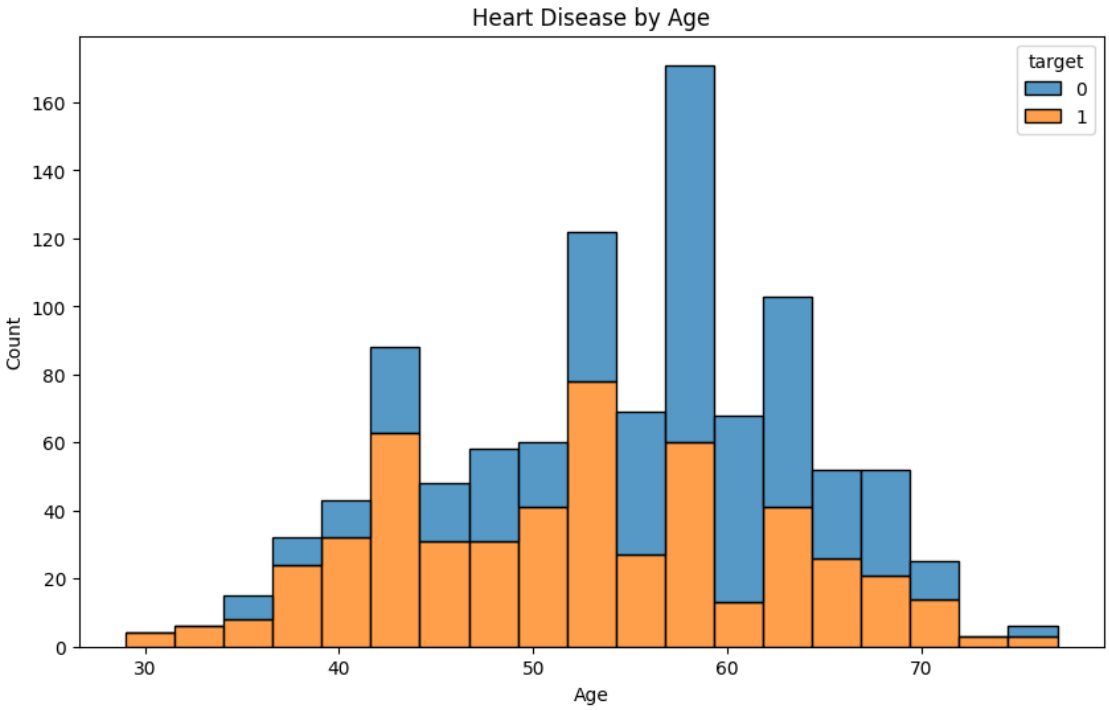
[28]:
```
# Plot distribution of heart disease rates
plt.figure(figsize=(10, 6))
sns.countplot(x='target', data=data)
plt.title('Distribution of Heart Disease Rates')
plt.xlabel('Heart Disease')
plt.ylabel('Count')
plt.show()
```




[29]:
```
# Plot heart disease by gender
plt.figure(figsize=(10, 6))
sns.countplot(x='sex', hue='target', data=data)
plt.title('Heart Disease by Gender')
plt.xlabel('Gender')
plt.ylabel('Count')
plt.show()
```

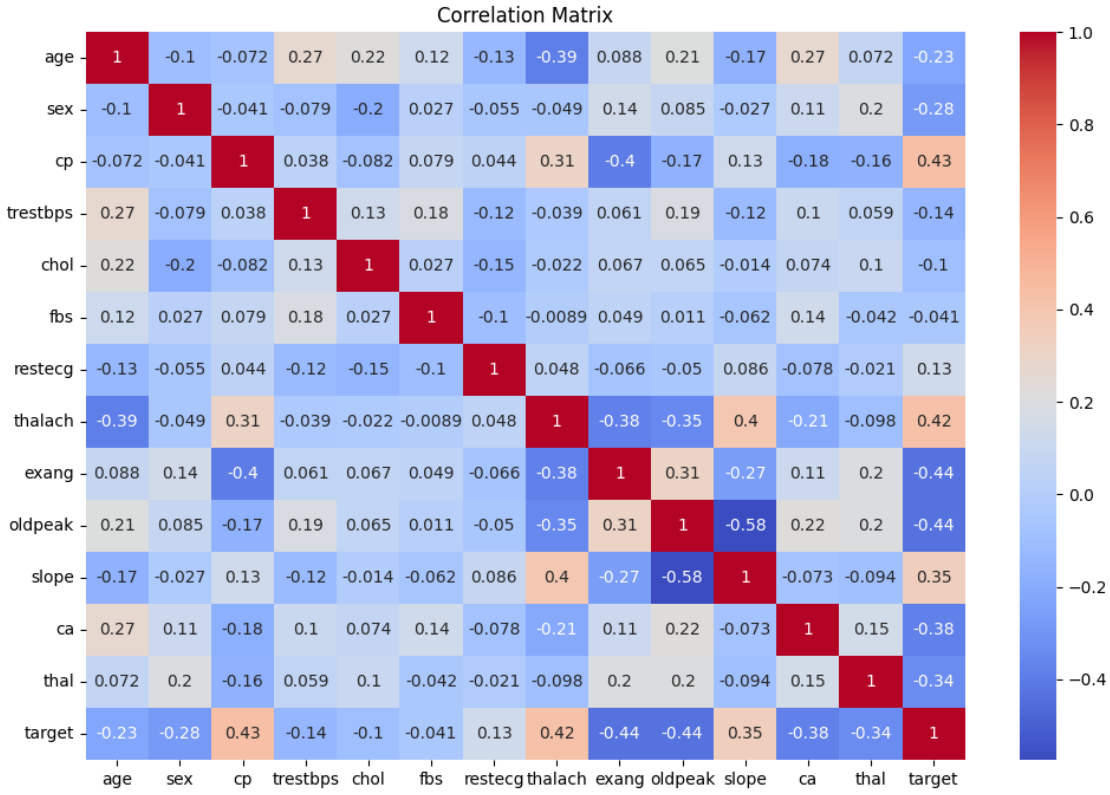



[30]:
```
# Plot heart disease by age
plt.figure(figsize=(10, 6))
sns.histplot(data=data, x='age', hue='target', multiple='stack')
plt.title('Heart Disease by Age')
plt.xlabel('Age')
plt.ylabel('Count')
plt.show()
```




Identifying Correlations

[31]:
```
# Correlation matrix
corr_matrix=data.corr()
plt.figure(figsize=(12,8))
sns.heatmap(corr_matrix,annot=True,cmap='coolwarm')
plt.title('Correlation Matrix')
plt.show()
```




Model Building !

[32]:
```
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report
```

[33]:
```
# Split the data
X = data.drop('target', axis=1)
y = data['target']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
 ↪random_state=42)
```

[34]:
```
model=RandomForestClassifier(n_estimators=100,random_state=42)
model.fit(X_train,y_train)
```

[34]:
```
RandomForestClassifier(random_state=42)
```

[35]:
```
# Evaluating the model
y_pred = model.predict(X_test)
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support
```

```
              0       0.97      1.00      0.99       102
              1       1.00      0.97      0.99       103

       accuracy                           0.99       205
      macro avg       0.99      0.99      0.99       205
   weighted avg       0.99      0.99      0.99       205
```

[ ]: Tableau Public